

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

REC'D 26 AUG 2004

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2004/005968

International filing date (day/month/year)
27.02.2004

Priority date (day/month/year)
27.02.2003

International Patent Classification (IPC) or both national classification and IPC
H04L1/06

Applicant
INTEL CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/005968

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
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Box No. II Priority

1. ☒ The following document has not been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).
- ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|---------------------------|
| Novelty (N) | Yes: Claims | 3-5, 11-13, 18-20 |
| | No: Claims | 1, 2, 6-10, 14-17, 21, 22 |
| Inventive step (IS) | Yes: Claims | 3-5, 11-13, 18-20 |
| | No: Claims | 1, 2, 6-10, 14-17, 21, 22 |
| Industrial applicability (IA) | Yes: Claims | 1-22 |
| | No: Claims | |

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1: LEE K F ET AL.: "A Space-frequency Transmitter Diversity Technique for OFDM Systems" GLOBECOM 2000, IEEE GLOBAL TELECOMMUNICATIONS CONFERENCE, San Francisco, CA, vol. 3, 27 November 2000, pages 1473-1477;
- D2: LI LIHUA ET AL: "A practical space-frequency block coded OFDM scheme for fast fading broadband channels" IEEE INTERNATIONAL SYMPOSIUM ON PERSONAL, INDOOR AND MOBILE RADIO COMMUNICATIONS, PIMRC 2002, vol. 1, 15 September 2002, pages 212-216;
- D3: GUILLAUD M AND SLOCK D T M: "Full-Rate Full-Diversity Space-Frequency Coding for MIMO OFDM Systems" PROCEEDINGS OF THE 3RD BENELUX SIGNAL PROCESSING SYMPOSIUM, LEUVEN, BELGIUM, 21 March 2002 , pages S02-1 - S02-4.

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim **1** is not new in the sense of Article 33(2) PCT.

The document **D1** discloses (the references in parentheses applying to this document) a method comprising the steps of:

- receiving content for transmission ($X(m)$, fig.2) for a plurality of transmit antennas ($Tx1-Tx2$); and
- generating a rate-one (see equations (1), (2) and page 1477, left column, last paragraph) space-frequency code matrix (G_2 ; page 1474, right column, last two paragraphs) from the received content for transmission.

The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claims **9** and **16**, which therefore are also considered not new.

Document **D2** is considered equally relevant in anticipating the subject-matter of claim **1**, **9**, **16** as the space-frequency code disclosed therein is also rate one when $P=Q$ (see section IV).

Also the space-frequency code disclosed in document **D3** appears to be rate one in view of its full-rate precoding (see in particular section 2) and therefore anticipates the subject-matter of claims **1, 9, 16**.

Dependent claims **2, 6, 7, 8, 10, 14, 15, 17, 21, 22** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see documents **D1, D2, D3** and the corresponding passages cited in the search report.

The combination of the features of dependent claims **3-5**, resp. **11-13** and **18-20**, is neither known from, nor rendered obvious by, the available prior art.

Re Item VII

Certain defects in the international application

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents **D1, D2, D3** is not mentioned in the description, nor are these documents identified therein.

Re Item VIII

Certain observations on the international application

Claims **1, 6, 7, 9, 14, 15, 21, 22** do not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined.

The claims attempt to define the subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.

It is also clear from the description (see for example page 15, lines 9-16 and the proof provided on pages 19-20) that the features of dependent claims **3-5** (resp. **11-13** and **18-20**) are essential for solving the problem stated in the description, page 2, lines 15-19, of obtaining a rate-one space-frequency code providing diversity gain for more than two transmit antennas.

**WRITTEN OPINION OF THE
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International application No.

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Since independent claims **1, 9, 16** do not contain these features they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.